REMARKS

This is a response to the Office Action of December 17, 2004, which dealt with pending Claims 19-48.

To summarize the claims now pending herein, the Examiner is advised that the application, as a result of this Response, contains Claims 19-40, 42, and 45-54.

In view of presentation of the claim set attached hereto, and in light of the comments presented below, further and favorable consideration of this application is respectfully requested.

Prior Rejections Under 35 USC §112:

The Examiner previously objected to Claims 19, 20 and 38-48 as indefinite, the rejection principally being directed to the language in independent Claims 19, 20, 38 and 45, as discussed in paragraph 2 of the Office Action. The Examiner is advised that all of the independent claims remaining herein, including any of the above-numbered remaining claims or any replacements therefor, have been suitably amended in a manner which is believed to more closely conform to the Examiner's suggestions. The Examiner's suggestion in this regard is acknowledged with thanks, and all of the prior objections under 35 USC §112 are now believed overcome.

Claims Previously Indicated as Allowed or Allowable:

Claims 19 and 20 have both been amended to overcome the prior indefiniteness rejection under 35 USC §112. Claims 19 and 20 are now believed allowable pursuant to the Examiner's prior indication in this regard.

Claims 21-37 were previously allowed by the Examiner. These claims remain in the application and hence are still believed to be in an allowed status, based on the Examiner's prior indication in this respect.

Independent Claim 38 has been maintained and rewritten to overcome the Examiner's prior objections under 35 USC §112. Claim 38 has also been rewritten to incorporate therein the

limitations from prior dependent Claim 44, the latter having been previously indicated as containing allowable subject matter. Prior dependent Claim 44 has hence been cancelled, and inasmuch as Claim 38 now corresponds thereto, Claim 38 is believed allowable.

Claims 39 and 40 depend from Claim 38 and are similarly believed allowable.

Claim 41 was previously indicated as allowable, but objectionable since it was written in dependent form. Accordingly, Claim 41 has been cancelled and replaced by newly submitted independent Claim 49, the latter being a combination of prior Claims 38 and 41, but also incorporating therein language which is believed to avoid the prior indefiniteness objection with respect to Claim 38. Claim 49 is hence believed allowable. Claim 42 has been amended to depend from Claim 49 and is likewise believed allowable.

Prior dependent Claim 44 was indicated as containing allowable subject matter. Accordingly, this claim has been cancelled and replaced by new independent Claim 50, the latter being a combination of prior Claims 38 and 44. Claim 50 is thus believed allowable.

Dependent Claims 47 and 48 (which refer back to previously rejected Claim 45) were both indicated as containing allowable subject matter. Claims 47 and 48 have been maintained herein in their previously presented form, and are believed to still represent allowable subject matter, consistent with the Examiner's prior indication.

Remaining Claims for Consideration:

Other claims remaining for consideration herein are Claims 45-46 and 51-54, as discussed in greater detail below.

More specifically, Claims 45-46 have been maintained, with clarifying amendments having been presented in main Claim 45, including amendments which are believed to overcome the prior objections under 35 USC §112. Claim 51 is a newly presented independent claim which is patterned after prior

Claim 38, but which is written in a manner which is believed to provide improved clarity of definition with respect to the process of this invention. Claims 52-54 refer back to Claim 51 and provide additional definition with respect to the present invention. All of Claims 45-46 and 51-54 are believed to patentably distinguish over the previously cited and applied British Patent No. 631 417 (herein GB '417) under both 35 USC 102 and 35 USC 103, as discussed in greater detail hereinafter.

Discussion re Claim 45:

The Examiner previously rejected Claim 45 under 35 USC 103(a) as unpatentable over GB '417, and this rejection is explained in some detail on page 3 of the last Office Action. It is submitted that the Examiner's prior conclusions which led to this rejection, however, are contrary to the requirements of 35 USC 103.

Specifically, Claim 45 requires a process involving the following:

> "providing first and second substantially identical elongate nozzle members having substantially identical discharge openings at tip ends thereof,...to permit the nozzle members to be inserted through the access openings"
>
> "relatively moving the first and second support members toward one another...so that the nozzle members are substantially aligned and the discharge openings thereof are positioned closely adjacent and in directly opposed relationship to one another and define a small unobstructed gap therebetween"
>
> "simultaneously supplying substantially identical streams of pressurized blasting media, as defined by a pressurized high velocity carrier fluid having solid abrasive particles entrained therein, to the discharge openings of said first and second nozzle members" (emphasis added)

"simultaneously discharging substantially identical and opposed high velocity streams of blasting media from said discharge openings...and cause the blasting media of both streams to be deflected outwardly in substantially perpendicular relationship..." (emphasis added).

In the present invention, as defined in Claim 45 as summarized above, the pair of substantially identical and opposed nozzles discharge substantially identical streams of pressurized blasting media, each stream being defined by a pressurized high-velocity carrier fluid having solid abrasive particles entrained therein, so that these streams directly impact and the opposed flowing blasting particles also directly impact and hence create a substantially annular pattern which is discharged substantially perpendicularly outwardly from the nozzle discharge direction so as to create an annular band of high energy impact with the surrounding boundary wall, with this impact hence occurring dominantly in a substantially perpendicular orientation with the surrounding boundary wall. Contrary to the Examiner's prior assertion, this desired process is neither disclosed nor suggested by GB '417. Rather, GB '417 discloses a process which it is believed can not be practically carried out, and in addition contains no teaching as to what modifications are necessary in order to provide a practical and workable process. Rather, such teaching is contained solely in the present application, and extracting the teaching of this application in an attempt to modify the process of GB '417 is clearly an improper hindsight modification which is contrary to the obviousness requirements of 35 USC 103.

More specifically, in the Office Action, second paragraph of page 3, the Examiner concludes that it would have been obvious to one of ordinary skill to modify the process of GB '417 to supply streams of abrasive and air through both nozzles, and the Examiner additionally asserts that this would "inherently meet the 'equal' limitations for the radial

deflection". It is submitted, however, that the Examiner's conclusions in this respect are improper and in fact clearly involve a hindsight modification of the GB '417 process based on the teachings contained in the present application. In this respect, close scrutiny of GB '417 indicates that the only suggestion therein involves a process utilizing different nozzles as is apparent from the drawing, which nozzles have different discharge orifices reflecting the intent to supply different streams to each. The GB '417 disclosure also suggests supplying shot peens to only one nozzle, and then teaches that such system will allegedly function in the manner illustrated by the drawing, namely effecting a radial perpendicular outward flow of the deflected shot peens. If GB '417 worked in the manner as asserted, then it is submitted there would be no obvious advantage in modifying it in the manner suggested by the Examiner, nor is there any suggestion as to the desirability or need for providing equal opposed streams since, even if both streams of GB '417 included abrasive particles, there is clearly no teaching or suggestion for making the streams equal, and such "equal" streams are clearly not "inherent" as asserted by the Examiner. Overall study of GB '417 and of the process defined therein clearly indicates that this document, in its entirety, contains no suggestion or need for modification of the disclosed process, and hence there is absolutely no motivation to modify the process as proposed by the Examiner. Rather, the only motivation to make the modifications proposed by the Examiner is contained in the teaching of this application.

Furthermore, it is submitted that the disclosure of GB '417 is misleading and inaccurate, and that from a practical standpoint, one would not be able to derive the improved process and process results associated with the present invention. In this regard, GB '417 attempts to deflect a stream containing high-velocity flowing shot (presumably steel shot) by impinging the shot-bearing stream against solely an opposed air stream. If this was done within

practical pressure and velocity limits, the process proposed by GB '417 probably would be incapable of effecting perpendicular radial deflection of the shot peen in the manner illustrated by the GB '417 drawing. Rather, any deflection, at best, would probably result in the shot peen being deflected into a conical dispersion, similar to that illustrated by cited U.S. Patent No. 4 380 477, which dispersion is significantly less effective with respect to the treating of the surrounding boundary wall. In this regard, when solid abrasive particles such as steel shot is discharged in an air stream, the energy at discharge is a function of mass (M) and discharge velocity (V) squared. The opposed discharge stream of GB '417 is solely air, and hence the discharged mass from the opposed stream is extremely small (and substantially insiginificant) in comparison to the very large mass associated with steel shot entrained in the other stream. For this reason, the opposed stream defined solely by air in the GB '417 process would possess insufficient energy to cause the steel shot to deflect perpendicularly outwardly as asserted by the GB '417 drawing.

As an example, steel shot has a density of about 7.87 gm/cm^3 whereas air has a density of about .0013 gm/cm^3. The ratio of the mass defined by the steel shot in one stream, relative to the mass of air in the opposed stream, hence could be of the order of about 6,000 to 1. Hence, since the opposed impacting streams must have approximately similar energies in order to effect outward perpendicular deflection of the shot, this requires that the discharge velocity from the air-only nozzle must be significantly greater than the discharge velocity associated with the air/shot nozzle. In fact the square of the velocity V1 of the air-only nozzle has to be about 6,000 times greater than the square of the velocity V2 of the air-shot nozzle. Under this scenario, if one assumes that the discharge velocity V2 of the air/shot stream is about 80 ft/sec, then the discharge velocity of the air-only nozzle would have to be in the neighborhood of 6,000 ft/sec. It is

believed that these relationships, which are obviously only approximates nevertheless clearly evidence that the process disclosed by GB '417 is incapable, from a practical standpoint, of performing in the manner disclosed, and the GB '417 patent contains no teaching or suggestion as to what is required in order to provide the highly improved results which are achieved utilizing the process of this invention as defined by Claim 45 herein.

It should be noted that the Applicant did himself carry out experiments involving a process similar to the GB '417 process, and was unable to achieve results of the type which are allegedly illustrated by the drawing of GB '417. Only after further study and investigation, and experimental testing, was Applicant able to arrive at the improved process which is disclosed and defined herein and which provides highly improved performance with respect to treating the interior boundary wall of a tubelike chamber.

Accordingly, Claim 45, together with Claim 46 dependent thereon, is believed to clearly patentably distinguish over GB '417 under 35 USC 103.

In addition to the discussion above, it should additionally be noted that Claim 45 defines the process in relationship to a casting having access openings which communicate with opposite ends of an elongate chamber, the latter being of larger cross section than the access openings, and the process additionally defines the nozzles being engaged with and carried by supports which are disposed exteriorly on opposite sides of the castings so that the nozzle members protrude inwardly in aligned relationship through the access openings for communication with the interior chamber. These additional relationships, and the desirable result which they provide by permitting treating of bores or chambers interiorly of castings, are also neither taught nor suggested by GB '417, and there clearly is no motivation for modifying the arrangement of GB '417 so as to achieve this result. These

latter limitations are hence believed to additionally patentably distinguish over GB '417.

Thus, withdrawal of the prior rejection against Claims 45 and 46, and formal allowance of these claims is respectfully requested.

Discussion Regarding Claim 51:

As noted above, newly submitted Claim 51 is patterned after prior Claim 38, and defines the invention in a manner which is believed to also patentably distinguish over GB '417. In this regard, Claim 51 is similar to Claim 45 discussed above, in that it defines substantially identical elongated nozzles inserted into an interior chamber in aligned relationship to define a small unobstructed gap therebetween, simultaneously supplying substantially identical streams of pressurized blasting media as defined by high velocity carrier fluid having solid abrasive particles entrained therein to the discharge openings of both nozzles, and directly impacting the simultaneously discharged opposed streams to cause the blasting media to be deflected radially outwardly in substantially perpendicular relationship for treating the surrounding boundary wall of the chamber.

The process of Claim 51 is believed to clearly patentably distinguish over GB '417 for substantially the same reasons discussed above relative to Claim 45 inasmuch as modifying the process of GB '417 is neither taught nor suggested by the GB document, nor is there any motivation for one of ordinary skill to modify the GB '417 process in light of the disclosure therein. In addition, as also discussed in detail above, the process of GB '417 is believed to be an impractical one from a standard commercial use standpoint, and again there is no teaching nor motivation for modifying the GB '417 process in the manner of the present invention, which inventive process provides a practical mode of operation coupled with highly improved results.

Accordingly, Claim 51 is believed to patentably distinguish over GB '417 whether considered singularly or in combination.

Claims 52-54 depend from Claim 51 and define further limitations associated with the inventive process, with Claim 52 specifying the discharge velocities identified with the identical opposed streams, and Claim 53 specifying the basic pressure associated with the carrier fluid. These additional limitations are clearly neither suggested nor taught by GB '417, and in fact such is believed impractical based on the disclosure of the GB '417 process, particularly in light of the additional explanation set forth above relative to Claim 45. Claim 54 additionally specifies that this treating involves moving the nozzles first in one direction lengthwise of the chamber, and then in the reverse direction, thereby providing a highly desirable high-energy impacting of the media against the boundary wall to effect a very desirable surface treating thereof.

Accordingly, all of Claims 51-54 are believed allowable.

Further and favorable consideration of this application, and allowance of all claims pending herein, is respectfully requested.

Respectfully submitted,

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